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CLINICAL PERSPECTIVE

ERGONOMIC-RELATED INJURIES IN THE OPERATING ROOM (OR)

Rose Moss, MN, RN, CNOR
Perioperative Nurse Consultant/Medical Writer
C & R Moss LLC
Casa Grande, AZ

The dynamic nature of the hospital environment, combined with serious hazards, such as lifting and moving heavy patients and equipment and slips, trips, and falls, make it a dangerous workplace setting.[1] The OR presents additional, unique challenges in regards to ergonomic-related injuries; the occupational hazards inherent to the perioperative practice setting include, moving and lifting patients and heavy instruments and equipment, overexertion, lifting and holding patient extremities, and static and/or awkward postures (eg, standing and/or holding retractors for extended time periods).[2]

Because ergonomic-related injuries adversely affect health care workers (HCWs) and safe patient care, perioperative nurses and other personnel involved in surgical patient care must remain aware of the clinical and economic implications of ergonomic-related injuries, as well as best practices and solutions available today to make the OR a safer environment of care.

Causes of Ergonomic-Related Injuries in the OR

The two leading causes of work related ergonomic injuries among hospital workers include overexertion and bodily reaction often related to patient handling (48%), including motions such as lifting, bending, or reaching, and slips, trips, and falls (25%).[3]

Fatigue is another cause of ergonomic-related injuries and staff accidents in the OR.[4] In the surgical practice setting, fatigue is primarily related to the work schedule and sleep, but the degree to which comfort has been incorporated into the design of the OR features and equipment may also be a factor.

Incidence of Ergonomic-Related Injuries

United States

In 2011, hospitals in the United States reported 253,700 work-related injuries and illnesses; this is a rate of 6.8 work-related injuries and illnesses for every 100 full-time employees, which is almost double the rate for private industry as a whole.[5]

Compared to other occupations, nursing personnel are among those at highest risk for musculoskeletal disorders (MSDs); on

the United States Bureau of Labor Statistics (BLS) list of occupations at-risk for sprains and strains, nursing personnel, nurse aides, orderlies and attendants are listed as first and registered nurses (RNs) are sixth, compared to truck drivers (second); laborers (third); stock handlers and baggers (seventh); and construction workers (eighth).[6]

Data from the United States BLS for 2009 show that the incidence rate of lost-workday injuries from slips, trips, and falls on the same level in hospitals was 38.2 per 10,000 employees; this was 90% greater than the average rate for all other private industries combined (20.1 per 10,000 employees).[7]

In addition, strains and sprains represent 54% of injuries that result in days away from work; strains also account for the largest share of workers' compensation claim costs for hospitals.[8] In 2011, hospitals in the United States reported 16,680 cases in which workers missed work because of a musculoskeletal injury related to patient interactions; nurses and nursing assistants both accounted for a substantial share of this total. Since the majority of musculoskeletal injuries in the hospital setting are cumulative, any steps taken to minimize risks during patient handling activities will provide significant benefits for hospital workers.

Europe

Within the workplace across Member States, the true extent of MSDs and their related costs are difficult to assess and compare, due to the various organizations of insurance systems, the lack of standardized assessment criteria, and questions about the validity of the reported data.[9]

Asia/Pacific

In the Asia/Pacific region, there is no standard method of tracking occupational ergonomic-related injuries.

In Australia, 19,248 successful workers' compensation claims for serious injuries or illness were made by the health care and community services sector between 2011 and 2012; of these claims, over half (52%) were muscular stress related to manual moving or repetitive movement; 18% were for slips, trips, and falls.[10]

In Singapore, data from the Ministry of Manpower for 2010 to 2011 reported a 295 temporary disablement rate per 100,000 persons employed in the health care sector; this report identified slips, trips, and falls as one of the top three incident types that accounted for over half (56%) of temporary disablements in 2011.[11]

A study in the *International Journal of Occupational Safety and Ergonomics* noted that Korean (93.6%), Australian (92.6%), and Japanese (78.4%) nurses incur a very high MSD burden when compared internationally.[12]

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Associated Costs of Ergonomic Injuries

In the United States, occupational ergonomic injuries are costly to hospitals both directly and indirectly,[13] as described below.

- $15,860 USD: this was the average reported workers' compensation claim for a hospital injury between 2006 and 2011.[14] Another source cites an average cost of $22,300 USD for claims involving lost time, in comparison to $900 for claims not involving lost time.[15] The average hospital in the United States incurs $0.78 USD in workers' compensation losses for every $100 USD of payroll; nationwide, the annual expense totals $2 billion USD.[16]
- 24% of nurses and nursing assistants changed their shifts or took sick days to recover from an unreported injury.[17]
- $27,000 to $103,000 USD are the estimated costs associated with replacing a nurse; these costs include separation, recruiting, hiring, orientation, and training.[18] Some estimates also include lost productivity while a replacement nurse is hired and trained.
- 8 out of 10 nurses (80%) report that they frequently work with musculoskeletal pain.[19]
- Safer caregivers result in happier patients. Studies have demonstrated higher patient satisfaction levels in hospitals where fewer nurses are dissatisfied or burned out.[20]

Work-related slips, trips, and falls are also associated with serious, disabling injuries that can impact a HCW's ability to do his/her job; these incidents often result in costs associated with:

- lost workdays;
- decreased productivity; and
- expensive worker compensation claims.[21]

In Europe, some studies have estimated the cost of work-related upper extremity MSDs at between 0.5% and 2% of the Gross National Product.[22] More recent data from Austria, Germany, or France have demonstrated an increasing impact of MSDs on costs. For example, in France, 2007 data show that work-related MSDs resulted in nearly 7.5 million lost work days, with approximate costs of €736 million.[23]

In Australia, for financial year 2008-2009, the total economic cost of work-related injuries and illnesses was estimated to be A$60.6 billion dollars, representing 4.8% of the Gross Domestic Product.[24]

Best Practices for Preventing Ergonomic-Related Injuries in the OR

Today, there are regulations as well as best practices outlined by professional nursing associations to prevent ergonomic-related injuries in the OR, as described below.

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State No Lift Laws

In the United States, the following 11 states have enacted "safe patient handling" laws or published rules and regulations: California, Illinois, Maryland, Minnesota, Missouri, New Jersey, New York, Ohio, Rhode Island, Texas, and Washington; there is a resolution from Hawaii. Of these states, ten (California, Illinois, Maryland, Minnesota, Missouri, New Jersey, New York, Rhode Island, Texas, and Washington) require a comprehensive program in health care facilities, consisting of an established policy and guidelines for obtaining appropriate equipment and training, data collection, and evaluation.[25]

American Nurses Association

The ANA supports policies and actions result in the elimination of manual patient handling, in order to provide a safe environment of care for both nurses as well as patients.[26] The ANA recognizes that MSDs are common in nurses, frequently caused by manually moving of patients; and can be life altering and sometimes, career-ending events. The ANA's Handle with Care® Campaign is designed to develop and implement a proactive, multi-faceted plan to support the issue of safe patient handling and the prevention of MSDs among nurses in the United States.[27] One component of this campaign relates to the effectiveness of safe patient handling equipment and devices, which has eliminated manual patient handling in nursing care. Moreover, many of the health care facilities that have incorporated patient handling technology have reported reductions in both nursing staff injuries, number of lost work days secondary to injury and staff turnover, and workers' compensation costs for MSDs.

Association of periOperative Registered Nurses (AORN)

AORN publishes and regularly updates three documents related to preventing work-related injuries.

- Guidance Statement: Safe Patient Handling and Movement in the Perioperative Setting.[28] This document identifies seven critical activities and corresponding recommended ergonomic tools developed for safe patient handing and movement to eliminate work-related MSDs; they include the use of various types of assistive technologies and mechanical devices. This statement also notes that manufacturers are encouraged to continue to develop new and innovative technologies for the safety of both HCWs and patients.

- Guideline for a Safe Environment of Care, Part I.[29] Recommendation I states:

  "*Precautions should be taken to mitigate the risk of occupational injuries that may result in death, days lost from work, work restrictions, medical treatment beyond first aid, and loss of consciousness.*"

  The recommendations for an ergonomically health perioperative environment include the following.
  - Educate staff members on the use of patient handling devices and strategies to prevent musculoskeletal injuries.

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- Provide appropriate assistive patient handling equipment.
- Cover equipment cables across the floor.
- Use anti-fatigue mats.
- Use lift teams as well as assistive devices to lift or transfer patients.

In addition, AORN includes a discussion on ergonomic hazards specific to minimally invasive surgery in the Guideline for Minimally Invasive Surgery including recommended provisions for slips, trips, and falls, adequate lighting, and location of equipment that prevents fatigue from glare or static positions.[30]

Proven effective techniques to reduce ergonomic-related injuries include the following.[31,32,33]

- Select appropriate mechanical patient-handling equipment and devices.
- Provide sufficient training on proper operation of lifting equipment.
- Complete patient mobility assessment with accurate alignment to equipment and protocols.
- Develop safe-lifting policies and procedures.
- Initiate specialized patient lift teams when available.

Today, various solutions that reduce injuries and increase HCW and patient safety are available. Equipment and devices specifically designed to prevent ergonomic-related injuries in the OR include the following.

- Patient transfer sheets. *Friction-reducing, patient transfer and repositioning sheets are designed to prevent disabling back injuries to HCWs by reducing* physical strain to the back, shoulders, neck and arms.
- Anti-fatigue mats. *Anti-fatigue mats are designed to decrease stress and strain placed on muscles and joints due to static positions (eg, standing during lengthy procedures).*
- Ergonomic step stools. Step stools designed with a cushioned top can provide comfort and support during prolonged standing.
- Trip management system. This system consists of a cord cover designed to reduce trips and falls caused by cords and tubings on the OR floor. Brightly colored cord covers are preferable so they are easily seen; they also serve as signals to alert healthcare personnel about the location of cords and tubings on the floor. Adhesive strips are typically included to keep cords in place during use.
- Fluid management systems using absorbent floor pads. To prevent slips and falls in the OR, one of the best measures is to control fluids at their source (ie, so that they never reach the floor).[34] Proactive measures that can be taken to prevent OR floors from becoming wet include the use of the following.
  - Absorbent pads on the floor around the OR table.These pads reduce the risk of slips and falls by keeping the floor dry. The absorbent materials in these pads generally absorb fluid without expanding, similar to diapers, so they

maintain a low profile and do not become tripping hazards. A fluid-proof, non-slip backing keeps the floor underneath each pad dry.

- Fluid waste management systems.[35] Intraoperative floor suction devices are generally used in high-fluid-volume cases (eg, arthroscopies). Fluid collection systems are drapes that incorporate fluid collection bags.

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